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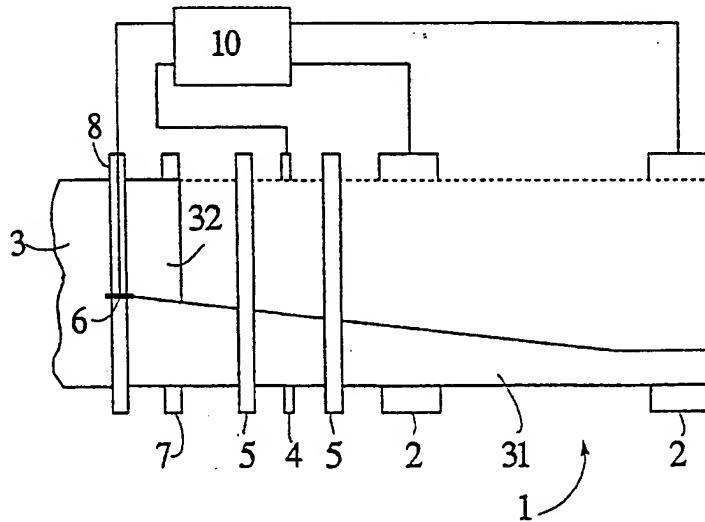
— With international search report.

[Continued on next page]

(54) Title: METHOD OF THREADING



WO 01/00516 A1



(57) Abstract: A method for threading a material web (3) through a processing plant (1). The material web (3) is divided, by a longitudinal cut, into a first narrow part (31) and a second broad part (32), the first part (31) being passed through the processing plant (1) while the second part (32) is separated. The width of the first part (31) is increased successively so that a growing share of the material web (3) is passed through the processing plant (1). Finally the entire width of the material web (3) is passed through the processing plant (1). The material web (3) is pulled through the processing plant (1) by a controllable force (tension). The magnitude of the controllable force is automatically adjusted to the width of the first part (31) of the material web (3), preferably in such manner that the magnitude of the force is selected proportional to the width of the first part (31).



— *Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

METHOD OF THREADING

FIELD OF THE INVENTION

The present invention relates to a method for threading a material web through a processing plant.

5 The method is specifically adapted for threading a material web through a processing plant, in which the material web, in alternating directions, passes through two or more decks, and in particular when the processing plant is adapted to tension the material web by
10 regulating the speed of one or more conveying cylinders so that somehow established tractive force is transferred to the material web.

BACKGROUND ART

15 Material webs, such as pulp webs or paper webs, are in technical contexts processed with widths of several meters and at considerable web speeds. Moreover, transfer often occurs between two or more processing steps, in
20 which an accurate control is necessary to prevent operational disorder.

Especially when starting operation, the transfer between processing steps is a most critical point. When transferring a material web between two processing steps, one therefore usually begins with a narrow strip at one edge of the material web, a so-called leader. The leader is pulled through the processing step and then the width of the material to be processed is successively increased until finally the entire width is reached. The part separated during the threading is rejected or recycled for reworking.

If the processing plant comprises more than two steps, the threading process must be repeated in each transition. This means that the reliability and speed of

a threading method is most important to efficiency and economic yield. Each failure costs a lot of money.

Originally the width of the leader is purposely very small relative to the full width of the material web. As 5 the successive increase of the width proceeds, it may during the threading, in one and the same processing step, be a web of material with a width from e.g. 0.1 m to 6 m. This means that the force by which the web is pulled through the processing step must be controlled 10 most accurately. The length of the web in a processing step can, e.g. in paper and pulp dryers, be several hundreds of meters. However, the critical point is where the web enters a drier since the low dry solids content then gives the lowest strength.

15 One example of a close prior-art method is described in US-5,158,648. This publication describes in detail the established technique using an edge strip in connection with threading and the drawbacks involved therein. As an improvement it is suggested that the web be broadened 20 symmetrically starting from a central point. To this end, use is made of two knives which are freely movable over the width of the web. This is said to prevent lateral movement and flapping of the web.

25 An operator monitors the process and controls the retrieval of slack and regulates the tension of the web.

OBJECT OF THE INVENTION

30 An object of the invention is to provide a quick and reliable method for threading a material web.

In particular the invention aims at providing a 35 quick and reliable method for threading in transferring a web of pulp from the wet end to a dryer when manufacturing papermaking pulp and in transferring a paper web from the wet end to a dryer when making paper.

SUMMARY OF THE INVENTION

The present invention relates to a method for threading a material web through a processing plant. The material web 5 is divided, by a longitudinal cut, into a first narrow part and a second broad part, the first part being passed through the processing plant while the second part is separated. The width of the first part is successively increased so that a growing share of the web-shaped 10 material is passed through the processing plant. Finally, the entire width of the material web is passed through the processing plant. The material web is pulled through the processing plant by a controllable force (tension).

In the method according to the invention, the magnitude 15 of the controllable force is automatically adjusted to the width of the first part of the material web, preferably so that the magnitude of the force is selected proportional to the width of the first part.

20 GENERAL DESCRIPTION OF THE INVENTION

When threading a material web through a processing plant, the web is divided, by a longitudinal cut, into a first narrow part and a second broad part, the first part being 25 passed through the processing plant while the second part is separated. The width of the first part is successively increased so that a growing share of the material web is passed through the processing plant. This is a critical phase in the production of, for example, paper. The risk 30 of repeated breaks of the web with the ensuing long down-times is obvious. The conventional method of controlling the force by which the leader is pulled through the dryer is that an operator first performs the retrieval of the slack forming on the occasion of starting and subsequently 35 manually increases the tractive force in the web, the so-called web tension, so that the web is kept suffi-

ciently tensioned but is not subjected to such stress as results in web break.

According to the present invention it is suggested that the magnitude of the controllable force that pulls the web through the dryer be automatically adjusted to the width of the first part, the leader, of the material web. This should in the first place occur in such manner that the magnitude of the force is selected proportional to the width of the first part.

The preferred principle is that the magnitude of the force is adjusted proportional to the width of the web when entering the dryer. This can be carried out, for example, by synchronous control of the position of the knife dividing the web and the tractive force giving the tension to the web. A further possibility is that the width of the web is measured in the vicinity of the web entering the dryer and that this measured value is allowed to control the tractive force.

After an initial interval with an essentially constant width, the width of that part which is passed through the processing plant is successively increased. This may occur continuously, but occurs suitably through at least two monotonously growing phases with an intermediate interval with an essentially constant width, preferably through three or more monotonously growing phases with intermediate intervals with essentially constant widths.

If the material web, in alternating directions, passes through two or more decks, the length of the intermediate interval or intervals should exceed the length of the web located in an individual deck. Suitably the length of the intermediate interval or intervals is smaller than twice the length of the web located in an individual deck.

The length of at least one monotonously growing phase should be smaller than the length of the web located in an individual deck. In a preferred embodiment,

the length of each of two or more monotonously growing phases, preferably the first phases, is smaller than the length of the web located in an individual deck.

5 The width of the first part during the initial interval should be 50-200 mm, preferably about 100 mm.

The width of the first part during one or more monotonously growing phases should be increased by a factor 2 to 5.

10 BRIEF DESCRIPTION OF THE FIGURES

The invention will now be described in more detail with reference to the accompanying drawing, in which

15 Fig. 1 is a schematic side view of a pulp dryer according to the invention; and

Fig 2 is a schematic top view of the same pulp dryer according to the invention.

20 DESCRIPTION OF A PREFERRED EMBODIMENT

Fig. 1 illustrates a simplified design of a pulp dryer 1 comprising four driven turning rolls 2 over which a pulp 25 web 3 is passed. At the inlet of the dryer 1, a movable knife 6 and a deflecting roll 7 are arranged, followed by a load sensing means 4 between two supporting rolls 5. The knife 6 can be moved transversely to an arbitrary position along a positioning means 8.

30 Fig. 2 is a top view of the same pulp dryer 1. Where applicable, the reference numerals are the same. In addition, a control unit 10 is illustrated, which is connected to the positioning means 8, the load sensing means 4 and the driving devices for the turning rolls 2.

35 The pulp web 3 is divided by means of the knife 6 into a leader 31 which is passed through the dryer 1, and a second part 32 which via the deflecting roll 7 is sepa-

rated and recirculated to the forming station (not shown) of the pulp web. The control unit 10 controls the position of the knife 6 with the aid of the positioning means 8 so that the desired width of the leader 31 is obtained.

5 The control unit 10 also controls the driving devices for the turning rolls 2, so that the load sensing means 4 registers a predetermined force in the web 3 (web tension).

By means of a threading belt (not shown) a narrow 10 leader 31 is first introduced into the dryer 1. Subsequently, the leader 31 is successively widened according to a predetermined programme so that finally the entire web 3 is passed through the dryer 1. The control unit 10 controls the driving of the turning rolls 15 2 so that the force in the web (web tension) grows proportionally to the width of the leader 31 at the inlet of the dryer 1. Preferably, this takes place by synchronous control of the position of the knife 6 and the desired value of the load sensing means 4.

CLAIMS

1. A method for threading a material web through a
5 processing plant, in which

the material web is divided by a longitudinal cut into a
first narrow part and a second broad part, the first part
being passed through the processing plant while the
10 second part is separated,

the width of the first part is increased successively so
that a growing share of the material web is passed
through the processing plant, so that

15 finally the entire width of the material web is passed
through the processing plant, and

20 the material web is pulled through the processing plant
by a controllable force (tension),

characterised in

25 that the magnitude of the controllable force is automatically
adjusted to the width of the first part of the
material web, preferably in such manner that the magnitude
of the force is selected proportional to the width
of the first part.

30 2. A method according to claim 1, characterised in that the magnitude of the controllable force is
automatically adjusted to the width of the first part of
the material web when entering the dryer, preferably so
that the magnitude of the force is selected proportional
35 to the width of the first part where the longitudinal cut
is made.

3. A method according to the claim 1 or 2,
characterised in

5 that the successive increase of the width of that part
which is passed through the processing plant is preceded
by an initial interval with an essentially constant
width, and

10 that the successive increase of the width of that part
which is passed through the processing plant occurs
through at least two monotonously growing phases with an
intermediate interval with an essentially constant width,
preferably through three or more monotonously growing
phases with intermediate intervals with essentially
15 constant widths.

4. A method as claimed in claim 1, 2 or 3, for threading
a material web through a processing plant, in which the
material web, in alternating directions, passes through
20 two or more decks, characterised in

that the length of the intermediate interval or intervals
exceeds the length of the material web located in an
individual deck, but

25 that the length of the intermediate interval or intervals
preferably is smaller than twice the length of the
material web located in an individual deck.

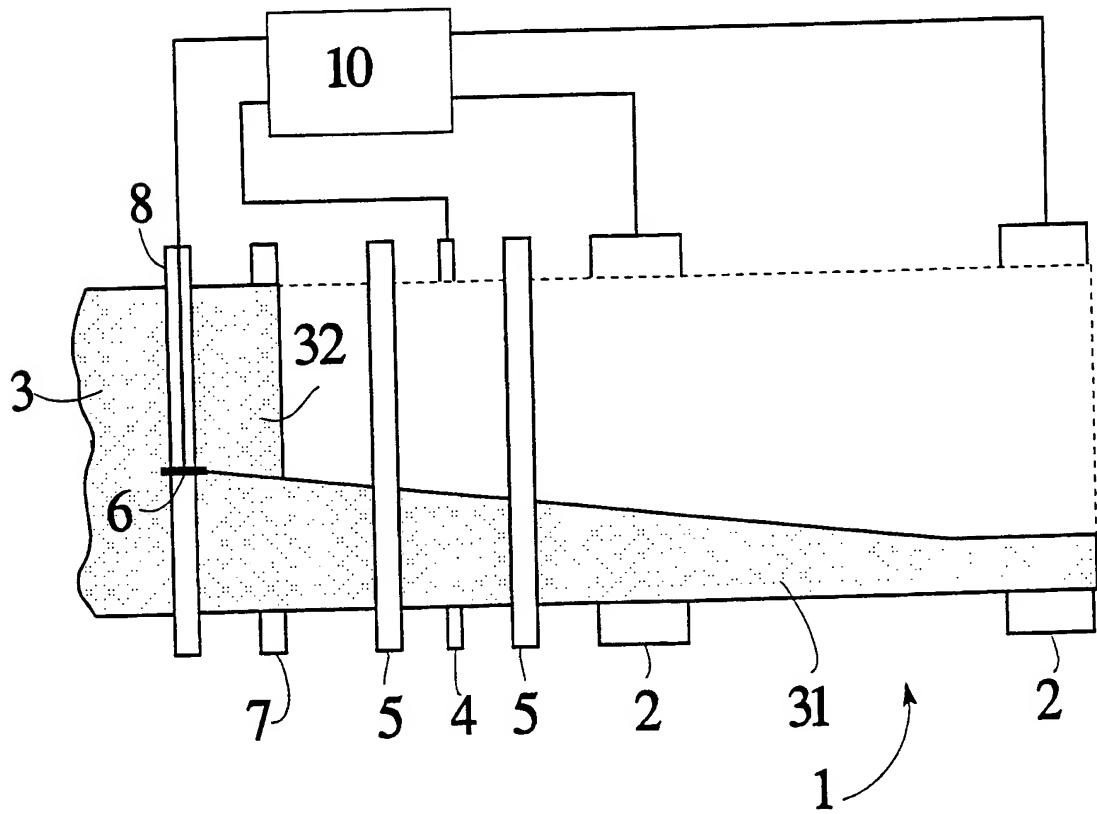
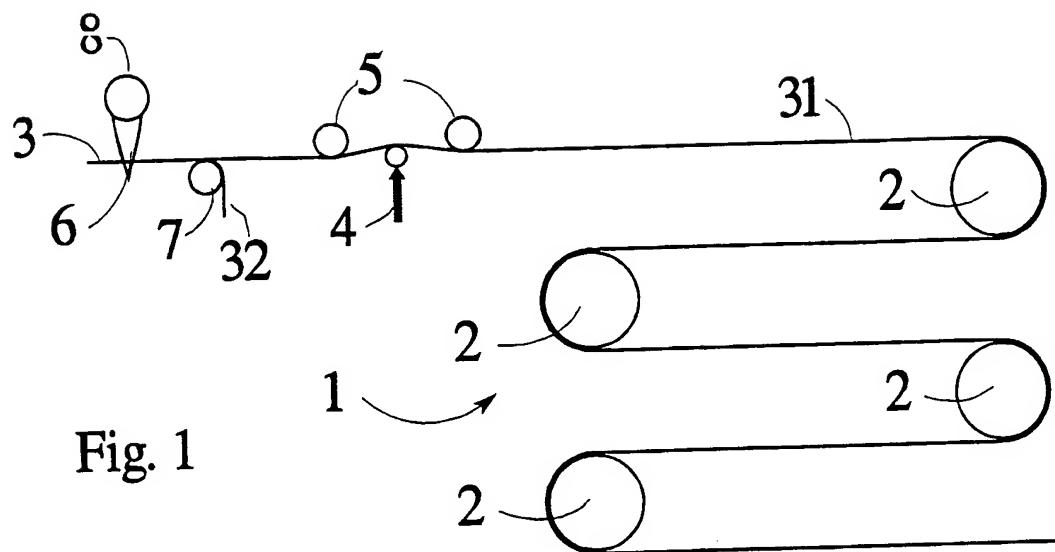
30 5. A method according to any one of the preceding claims,
characterised in
that the length of at least one monotonously growing
phase is smaller than the length of the material web
located in an individual deck.

6. A method according to any one of the preceding claims,
characterised in
that the length of each of two or more monotonously growing
phases, preferably the first phases, is smaller than
5 the length of the material web located in an individual
deck.

7. A method according to any one of the preceding claims,
characterised in
10 that the width of the first part during the initial
interval is 50-200 mm, preferably about 100 mm.

8. A method according to any one of the preceding claims,
characterised in
15 that the width of the first part during one or more monotonously growing phases is increased by a factor 2 to 5.

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INTERNATIONAL SEARCH REPORT

International application No. PCT/SE 00/01263
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A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B65H 20/00. D21F 7/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B65H, D21F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CA 2209882 A (LESKINEN, A ET AL), 5 January 1998 (05.01.98) --	1
A	US 5158648 A (S.B. WELDON), 27 October 1992 (27.10.92) -- -----	1

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed
- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

26 October 2000

Date of mailing of the international search report

31-10-2000

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Swedish Patent Office
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INTERNATIONAL SEARCH REPORT
Information on patent family members

03/10/00

International application No.
PCT/SE 00/01263

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
CA 2209882 A	05/01/98	EP	0816269 A	07/01/98
		FI	101372 B	00/00/00
		FI	962763 A	06/01/98
		JP	10067450 A	10/03/98
		US	6010091 A	04/01/00
US 5158648 A	27/10/92	US	5234549 A	10/08/93

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

Date of mailing (day/month/year) 07 February 2002 (07.02.02)	To: ABB Group Services Center AB Legal & Compliance/Intellectual Property S-120 86 Stockholm SUÈDE		
Applicant's or agent's file reference KN 3076 WO	IMPORTANT NOTIFICATION		
International application No. PCT/SE00/01263	International filing date (day/month/year) 16 June 2000 (16.06.00)		

1. The following indications appeared on record concerning:

the applicant the inventor the agent the common representative

Name and Address ABB AB Patent, Stockholm Office S-120 86 Stockholm Sweden	State of Nationality	State of Residence
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	Teleprinter No.	

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

the person the name the address the nationality the residence

Name and Address ABB Group Services Center AB Legal & Compliance/Intellectual Property S-120 86 Stockholm Sweden	State of Nationality	State of Residence
	Telephone No. +46 8 658 81 27	
	Facsimile No. +46 8 644 35 72	
	Teleprinter No.	

3. Further observations, if necessary:

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4. A copy of this notification has been sent to:

the receiving Office the designated Offices concerned
 the International Searching Authority the elected Offices concerned
 the International Preliminary Examining Authority other:

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Jean-Luc MARTIN Telephone No.: (41-22) 338.83.38
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PA^{NT} COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

Date of mailing (day/month/year) 15 February 2001 (15.02.01)	ETATS-UNIS D'AMERIQUE in its capacity as elected Office
International application No. PCT/SE00/01263	Applicant's or agent's file reference KN 3076 WO
International filing date (day/month/year) 16 June 2000 (16.06.00)	Priority date (day/month/year) 30 June 1999 (30.06.99)
Applicant	
FRANSSON, Tommy et al	

1. The designated Office is hereby notified of its election made:

in the demand filed with the International Preliminary Examining Authority on:

19 January 2001 (19.01.01)

in a notice effecting later election filed with the International Bureau on:

2. The election was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

<p>The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No.: (41-22) 740.14.35</p>	<p>Authorized officer R. E. Stoffel</p>
	<p>Telephone No.: (41-22) 338.83.38</p>